

## Chapter 2



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*Field sparrows*

# The Planning Process

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## Introduction

This chapter explains the planning process in developing the CCP; describes the influences of other national, regional, ecosystem, and State plans; and identifies refuge operational or step-down plans.

## Refuge System Planning Policy

The planning policy provides guidance, systematic direction, and minimum requirements for developing all CCPs, and stipulates a systematic decision-making process that fulfills those requirements. This policy also establishes requirements and guidance for Refuge System planning, including CCPs and step-down management plans. It states that we will manage all refuges in accordance with an approved CCP which, when implemented, will achieve refuge purposes; help fulfill the Refuge System mission; maintain and, where appropriate, restore the ecological integrity of each refuge and the Refuge System; help achieve the goals of the National Wilderness Preservation System; and meet other mandates [Service Manual (602 FW 1,2,3)].

The Refuge Improvement Act of 1997 stipulates that each CCP shall identify and describe:

- (A) The purposes of each refuge comprising the planning unit (*found in this chapter*).
- (B) The distribution, migration patterns, and abundance of fish, wildlife, and plant populations and related habitats within the planning unit (*Chapter 3, Existing Environment*).
- (C) The archaeological and cultural values of the planning unit (*chapter 3*).
- (D) Such areas within the planning unit that are suitable for use as administrative sites or visitor facilities (*Chapter 4, Management Direction and Implementation*).
- (E) Significant problems that may adversely affect the populations and habitats of fish, wildlife, and plants within the planning unit and the actions necessary to correct or mitigate such problems (*chapters 1, 2, 3, and 4*).
- (F) Opportunities for compatible wildlife-dependent recreational uses (*chapter 4*).

The use of sound science is also mandated by the Refuge Improvement Act and subsequent Service policies. The Refuge System planning policy specifically requires that CCPs be based on a “*comprehensive assessment of the existing scientific literature*.” Refuge planning policy also states that “*refuge planning will reflect conservation goals and objectives for the landscapes in which refuges are located. Refuges must review goals and objectives of existing ecosystem plans and determine how the refuge can best contribute to the functioning of the ecosystem*.” A great deal of study and effort has been devoted to this task and is extensively outlined and reviewed on page 2-4 through 2-18, Conservation Plans and Initiatives Guiding the Project.

### Other Mandates

Although Service and Refuge System policy plus each refuge’s unique legislated purposes provide foundation for its management, other Federal laws, executive orders, treaties, interstate compacts, and regulations on the conservation and protection of natural and cultural resources also affect how national wildlife refuges are managed. The *Digest of Federal Resource Laws of Interest to the USFWS* lists many of them, and can be accessed at: <http://fws.gov/laws/lawsdigest.html> (accessed January 2012).

Federal laws also require the Service to identify and preserve its important historic structures, archaeological sites, and artifacts. NEPA mandates our consideration of cultural resources in planning Federal actions. The

Refuge Improvement Act requires that the CCP for each refuge identify its archaeological and cultural values.

The National Historic Preservation Act (Pub. L. 102–575; 16 U.S.C. 470) requires Federal agencies to locate and protect historic resources—archaeological sites and historic structures eligible for listing or listed in the National Register of Historic Places and museum property—on their land or on land affected by their activities. It also requires agencies to establish a program for those activities and carry them out in consultation with state historic preservation offices.

The act also charges Federal agencies with locating, evaluating, and nominating sites on their lands for the National Register of Historic Places. We maintain an inventory of known archaeological sites and historic structures in the Northeast Regional Office and file copies of the sites at each refuge. Our regional historic preservation officer in Hadley, Massachusetts, oversees our compliance with the act and our consultations with state historic preservation offices. We must also comply with the Archaeological Resources Protection Act (pub. L. 96–95, 16 U.S.C. 470aa-mm) which requires that we protect our archaeological sites from vandalism or looting and issue permits for site excavation.

The Service also owns and cares for museum properties. The most common are archaeological collections, art, zoological and botanical collections, historical photographs, and historic objects. Each refuge maintains an inventory of its museum property. Our museum property coordinator in Hadley, Massachusetts, guides the refuges in caring for that property, and helps us comply with the Native American Graves Protection and Repatriation Act (25 U.S.C. 3001, et seq.) and Federal regulations governing Federal archaeological collections. Our program ensures that Service collections will continue to be available to the public for learning and research.

Chapter 5, Environmental Consequences, of the draft and final CCP/EIS evaluates this plan's compliance with the cultural and historic acts cited above, as well as the Clean Water Act, Clean Air Act, and Endangered Species Act. We designed the CCP/EIS to fulfill our NEPA compliance.

## **The Comprehensive Conservation Planning Process**

Service policy establishes an 8-step planning process that also facilitates compliance with NEPA (figure 2-1). Each of the individual steps is described in detail in the planning policy and CCP training materials (602 FWS 3, "The Comprehensive Conservation Planning Process"). The planning policy can be accessed at: <http://www.fws.gov/policy/602fw3.html> (accessed January 2012).

### **Planning Process**

The key to effective conservation begins with community involvement. To ensure future management of the refuge reflects the issues, concerns, and opportunities expressed by the public, a variety of public involvement techniques were used.

Open houses and public information meetings were held throughout the area at three different locations (Milton, Dover, and Lewes) during November 2005. Meetings were advertised locally through news releases, Web sites, and through our mailing list. For each meeting, the open house session was planned where people could informally learn of the project, and have their questions or concerns addressed in a one-on-one situation. The evening public information meeting sessions usually included a presentation of the refuge, a brief review of the Refuge System and the planning process, and a question and answer session. Participants were encouraged to actively express their opinions and suggestions. The public meetings allowed us to gather information and ideas from local residents, adjacent landowners, and various organizations and agencies.

A visitor survey and community survey were developed to encourage written comments on topics such as wildlife habitats, exotic nuisance species, and public access to the refuge. The visitor survey was distributed to 435 individuals

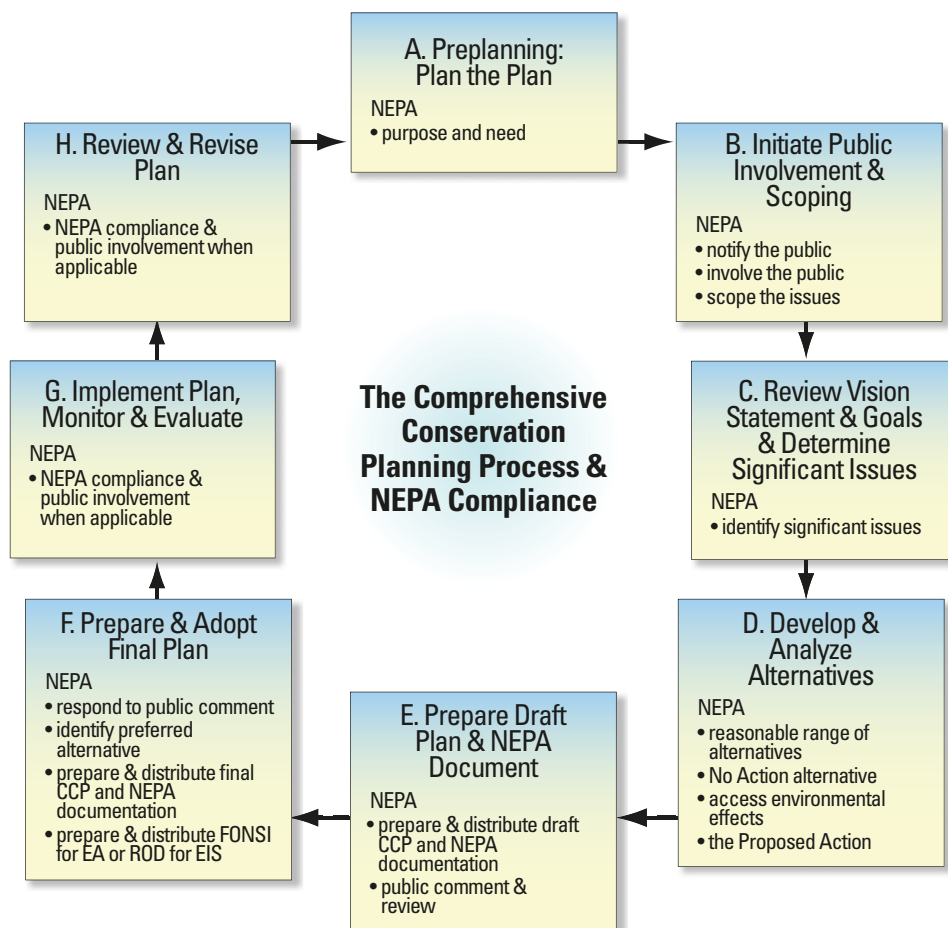
representing various user groups on the refuge. The community survey was distributed to 1,430 members of the local community using a stratified random sampling design. The response rates for the visitor and community surveys were 79 percent and 39 percent respectively.

We completed the draft CCP/EIS and initiated a public comment period that totaled 89 days, from May 31, 2012 to August 27, 2012. We also held seven public meetings in Milford, Milton, and Lewes, Delaware. We evaluated all the letters and e-mails sent to us during that comment period, along with comments recorded at our public hearing. Appendix M summarizes all of the substantive comments we received and provides our responses to them.

We completed the final CCP/EIS and initiated a 30-day review period on December 28, 2012.

At its completion, the CCP will be reviewed, evaluated, and subsequently updated approximately every 15 years in accordance with the Refuge Improvement Act and Service planning policy (602 FWS 1, 3, and 4). However, when significant new information becomes available, ecological conditions change, major refuge expansion occurs, or when we identify the need to do so, the plan will be reviewed sooner. All plan revisions will require NEPA compliance. If minor plan revisions are required and they meet the criteria of a categorical exclusion, then an environmental action statement, in accordance with (550 FW 3.3C) will only be needed. But if the plan requires a major revision, then the CCP process starts anew at the preplanning step [602 FW 3.8(B)].

**Figure 2-1. Steps in the Comprehensive Conservation Planning Process and its relationship to the National Environmental Policy Act of 1969**



## Conservation Plans and Initiatives Guiding the Project

### Service Migratory Bird Strategic Conservation Initiative

The 1988 amendment to the Fish and Wildlife Conservation Act mandates the Service to “identify species, subspecies, and populations of all migratory nongame birds that, without additional conservation actions, are likely to become candidates for listing under the Endangered Species Act (ESA) of 1973.” Publication of the Birds of Conservation Concern (BCC) 2008 is the most recent effort to carry out this mandate (USFWS 2008a). The goal of the BCC report is to accurately identify the migratory and non-migratory bird species (beyond those already designated as federally threatened or endangered) that represent our highest conservation priorities. The underlying philosophy behind BCC 2008 is that proactive bird conservation actions are necessary at a time when human impacts are at an all-time high to ensure the future of healthy avian populations and communities. BCC 2008 data and information serve as a barometer of the condition of the Nation’s avifauna from a national landscape scale funneled down to regional details.

The national BCC 2008 priority bird list provides an early warning of what birds species have the potential to decline to levels requiring ESA protection; it is to be consulted before actions are taken on Federal lands, and for research, monitoring, and management funding in accordance with Executive Order #13186 (Responsibilities of Federal Agencies to Protect Migratory Birds). This list contains 147 bird species of which 13 nest on the Prime Hook NWR and 26 are migrants utilizing refuge habitats during some part of the year. The national list serves as an outreach tool for educating the public about the precarious status of selected bird species across the U.S. As a general rule, the list is not used to foster bird conservation at smaller geographic scales; that is the purpose of the Bird Conservation Region (BCR) 30 and Service region lists.

Funneling the national bird list down to regional levels, the BCC 2008 report generates two other lists that include the refuge geographically: the BCR of New England/Mid-Atlantic (BCR 30) and the Service Region 5 list. The BCR 30 list identifies 45 species of conservation concern, of which 37 occur on the refuge; the Region 5 list identifies 52 species of concern, of which 40 occur on the refuge as either nesters or migrants in their annual life cycle (see High Priority BCR 30/R5 Composite Lists of Bird Species breeding or migrating on Prime Hook NWR below). These bird species in need of additional conservation actions were targeted as resources of concern in the development of this CCP and were also incorporated in upgrading of goals and objectives that will direct and guide the future of refuge management.

#### High Priority BCC 2008 Bird Species Nesting on Prime Hook NWR Based on BCR 30/R5 Composite lists:

Pied-billed grebe	Wood thrush
American bittern	Prairie warbler
Least bittern	Worm-eating warbler
Black rail	Henslow’s sparrow
American oystercatcher	Salt marsh sharp-tailed sparrow
Least tern	Seaside sparrow
Whip-poor-will	

#### High Priority BCC 2008 Migrant Bird Species on Prime Hook NWR Based on BCR 30/R5 Composite lists:

Red-throated loon	Short-billed dowitcher
Snowy egret	Gull-billed tern
Peregrine falcon	Black skimmer
Yellow rail	Red-headed woodpecker



Solitary sandpiper	Olive-side flycatcher
Lesser yellowlegs	Sedge wren
Whimbrel	Blue-winged warbler
Hudsonian godwit	Golden-winged warbler
Marbled godwit	Cerulean warbler
Red knot	Kentucky warbler
Semipalmated sandpiper	Canada warbler
Buff-breasted sandpiper	Nelson's sharp-tailed sparrow

In tandem with the BCC 2008 effort, the Service has also developed a 10-year national strategic migratory management plan to collaborate with its partners to recommit and set a successful course for migratory bird conservation over the next decade. The finalized plan, *A Blueprint for the Future of Migratory Birds: A Strategic Plan 2004-2014*, describes the challenges facing migratory bird conservation, with associated management strategies to meet these future challenges. The Service's plan formulates a strong recommitment to migratory bird conservation with the following vision statement: *"Through careful management built on solid science and diverse partnerships, the Service and its partners will restore and sustain the epic sweep of bird migration and the natural systems on which it depends—fostering a world in which bird populations continue to fulfill their ecological roles while lifting the human spirit and enriching human lives in infinite ways, for generations to come."*

The blueprint document points out that "birds enrich people's lives and have intrinsic value as threads in the earth's ecological tapestry, as pollinators, predators, and prey. Birds serve as excellent indicators of the health and quality of the environment as clean air, clean water and abundant, diverse natural habitats are essential for birds to survive and flourish." The plan also recognizes that birds are enjoyed by a large proportion of Americans, as more than 82 million residents of the U.S. (39 percent of adult population) participate in wildlife-related activities, and 64 million pursue bird-related recreation, contributing substantially to local economies throughout the Nation by spending more than \$40 billion dollars annually on these pursuits (Blueprint 2004).

Also identified were the major future challenges to conserve migratory birds. Declines in abundance of many landbird, shorebird, and waterbird populations are indicative of ecosystems that have been highly stressed and altered. Reductions in natural habitat quantity and quality are acknowledged as the primary causes of negative population trends in many bird species and are exacerbated by the direct loss of bird life from an array of environmental contaminants. Pesticides continue to poison birds and their food supplies. Invasive species and disease outbreaks also contribute to migratory bird mortality. Global climate change and demand for freshwater supplies pose current and future threats.

The Blueprint document explains that meeting these challenges will require consistent adherence to the principles of sound science. Many of these threats will be addressed in this CCP and we will use the best available scientific information to mitigate environmental dangers to migratory birds. The refuge and its partners will focus on these challenges in the most cost-effective manner to perpetuate avian populations.

#### Strategic Habitat Conservation/National Ecological Assessment Team Report Guidance

The Regional Director has stated that, "The Service is looking at a new way of doing business. The goal is to focus our work on conservation priorities and outcomes and less on program and regional organization." Recent advances in the field of conservation science are leading the Service toward a new direction of "strategic pursuit of sustainable landscapes." In the past, the Service relied more on conservation opportunities; however, the strategic habitat conservation

approach features more scientific ecosystem-level analysis used to better coordinate local, on-the-ground habitat conservation actions.

Strategic habitat conservation (SHC) is a science-driven framework for the strategic pursuit of defining and implementing conservation priorities for sustainable landscapes. This framework provides a scientific approach in identifying habitat conservation deficits on the landscape and filling in the gaps. SHC involves both cross-programmatic Service groups and non-Service conservation science partners' participation to restore, enhance, and manage local wildlife habitats. It features stepping down ecosystem-level Geographic Information System (GIS) analysis to coordinate local, on-the-ground conservation actions. SHC is trust resource centric, which focuses on under-represented habitats across the landscape, and relying on cross-pollination from all Service programs, state partners, and other conservation science expertise.

The SHC approach has been used in development of this CCP to formulate proposed refuge-specific habitat objectives and management strategies. This was done by stepping down the combined habitat goals of the Delaware River/Delmarva Coastal ecosystem plan and Delaware wildlife action plan. We focused on conservation target species of greatest conservation need and under-represented habitats identified in both ecosystem and State comprehensive wildlife plans, and used ecosystem-level GIS analysis and refuge vegetation mapping for to produce refuge-specific habitat objectives and management strategies. These objectives include conservation assessment elements of measurable biological outcomes, so we can develop an effective inventory and monitoring step-down plan after finalization of the CCP. Development of an inventory and monitoring plan will enable us to monitor and assess successes and failures of future conservation actions, and adjust or adapt new management strategies accordingly.

SHC provides an iterative framework of planning, implementation, and evaluation actions. It is an adaptive conservation management scheme that rotates around five main functions: strategic biological planning, conservation design, conservation delivery, monitoring, and research. The framework provides for continual refinement of management strategies at each iteration, constantly improving the achievement of desirable outcomes and examining the consequences of site-scale actions on landscape-scale functions.

The practice of SHC provides improved and defensible methods of habitat management planning and execution, with the greatest transparency possible to explain the rationale for refuge-specific habitat objectives and management strategies contained in this document. Prime Hook NWR has built into this CCP a working capacity for SHC and will continue to build SHC working capacity in subsequent stepped-down management plans.

#### **"Conserving the Future and Fulfilling the Promise" Document Guidance and Wildlife-Habitat-Process Report**

##### **Fulfilling the Promise**

The 1999 report, *Fulfilling the Promise, The National Wildlife Refuge System: Visions for Wildlife, Habitat, People, and Leadership* (USFWS 1999), was a culmination of a year-long process by teams of Service employees to evaluate the Refuge System Nationwide. This report was a result of the first-ever Refuge System conference held in Keystone, Colorado, in October 1998. It was attended by every refuge manager in the country, other Service employees, and scores of conservation organizations. The report contains 42 recommendations packaged with three vision statements dealing with wildlife and habitat, people, and leadership. We often looked to the recommendations in the document and subsequent promise team reports, when writing the CCP. For example, the 1999 report recommends forging new alliances through citizen and community partnerships and strengthening partnerships with the business community. One of the goals in our CCP is devoted almost entirely to the development of

community partnerships, while several of our strategies focus on forging new partnerships or strengthening existing ones.

### **Conserving the Future: Wildlife Refuges and the Next Generation**

Published in October 2011, *Conserving the Future: Wildlife Refuges and the Next Generation* establishes the Refuge System's new vision as it moves into the next decade of conservation following *Fulfilling the Promise* (USFWS 1999). This document builds upon the framework of *Fulfilling the Promise*. It is the result of 18 months of study and public conversation about conservation and the future of the Refuge System. It was drafted by Service employees and their conservation partners with input from Service employees, other state and Federal agencies, tribes, conservation agencies, and private citizens. When developed, this new course had to consider changes that occurred since *Fulfilling the Promise* was published, such as, an increasing and more diverse population, a challenged economy, a changing climate, and U.S. involvement in war. The report contains 24 recommendations packaged with eight vision statements. It seeks not only to further the Refuge System's mission, but also to raise the Service's profile in the broader national conservation effort. This new vision embraces bold new ideas to realize the full conservation potential of the Refuge System. It relies strongly on utilizing partnerships with both traditional and non-traditional partners. It also acknowledges that strategic, collaborative, science-based landscape conservation - along with effective public outreach, education, and environmental awareness, is the only path forward to conserve America's wildlife. As with the *Fulfilling the Promise* document, we have looked to the recommendations in this document when writing the CCP.

### **National Wildlife Refuge System Wildlife Habitat Goals Report**

Another important *Fulfilling the Promise* team effort focused on the need to have clear objectives on how the Refuge System will contribute to biological diversity in North America. In January 2004, the wildlife habitat goals team completed its final report, *A Process for Integrating Wildlife Population, Biodiversity, and Habitat Goals and Objectives of the NWR System: Coordinating with Partners at all Landscape Scales*. The report recognized the conservation biology principles that would be used by each refuge on how to best contribute to maintaining biodiversity and the process to determine biodiversity objectives and indicators for each individual refuge. These included native plant and animal species richness as important and useful indicators of biodiversity; species as a function of habitats; animal habitats as characterized by plant species composition, and plant habitats as characterized by physiographic features; and conservation of a broad range of physiographic features and plant communities to ensure the conservation of a wide range of species and other components of biodiversity.

The process describes how to compile national wildlife population, habitat, and biodiversity goals, and then step those down through regional, ecosystem and refuge levels. During the development of the CCP, we adopted the report's vegetation-based coarse-filter approach to identify habitat objectives, coupled with wildlife population-based fine-filter approach for biodiversity conservation (Berendzen et al. 2004).

Prime Hook NWR relied heavily on many partners when establishing refuge-specific conservation priorities, habitat objectives, and alternatives included in this document. These partners included Service Delaware Bay Estuary Project, USGS Water Resources Division Office, the Delaware Natural Heritage and Endangered Species Program, and the NatureServe Network.

### **The North American Waterfowl Management Plan**

The North American Waterfowl Management Plan (NAWMP) was originally written in 1986 to help protect continental habitat conditions that could sustain and improve waterfowl populations. It was updated in 1994, 1998, and 2004. This plan outlines the strategy among the U.S., Canada, and Mexico to protect North America's remaining wetlands and restore waterfowl populations through habitat



protection, restoration, and enhancement actions. The intent in preparing the 2004 plan was to define and update the needs, priorities, and strategies with a 15-year planning horizon; increase stakeholder confidence in the direction of plan actions; and guide partners in strengthening the biological foundation of North American waterfowl conservation (USFWS 2004). The 2004 update can be accessed at: <http://www.fws.gov/birdhabitat/NAWMP/Planstrategy.shtm> (accessed January 2012).

Implementation of this plan is accomplished at the regional level within designated regional habitat joint venture areas. Planned recovery actions identified in the plan, such as habitat restoration and enhancement, occur through these regionally based, self-directed partnership joint ventures that involve Federal, state, and provincial governments; Tribal nations; local businesses; conservation organizations; and individual citizens for the purpose of protecting habitat within joint venture areas. Prime Hook NWR is located within the Atlantic Coast Joint Venture (ACJV) area, which covers all Atlantic Flyway states from Maine to Florida, as well as Puerto Rico.

#### **Atlantic Coast Joint Venture**

The mission of the ACJV has continued to evolve with the decision to embrace a more comprehensive approach that addresses all-bird conservation, with an emphasis on waterfowl management. The goal of the ACJV is to *“Protect and manage priority wetland habitats for migration, wintering, and production of waterfowl, with special consideration to black ducks, and to benefit other wildlife in the joint venture area.”*

The ACJV implementation plan was revised June 2005 (USFWS 2005). The purpose of this plan is to step-down the continental and regional goals of the 2004 NAWMP to the ACJV area, present a current status assessment of waterfowl and their habitats within the joint venture, update focus area data for each state, and present habitat conservation goals and population indices for the ACJV consistent with the NAWMP. This revised version of the implementation plan also provides baseline information needed to move forward with a thorough approach for setting future habitat goals. The 2005 update of the implementation plan can be accessed at: [http://www.acjv.org/wip/acjv\\_wip\\_main.pdf](http://www.acjv.org/wip/acjv_wip_main.pdf) (accessed January 2012).

In order to capture the conservation needs of the diversity of landscapes within the ACJV, a three-tiered, hierarchical approach to mapping and defining areas, from coarsest to finest, was used. These include planning areas, focus areas and sub-focus areas, which target more than 113 million acres for conservation action to benefit waterfowl and other wetland-dependent species. The State of Delaware contains four focus areas and three sub-focus areas delineating 924,069 acres for intensifying waterfowl conservation management actions. Prime Hook NWR lies within the Bayshore focus area, which encompasses approximately 407,857 acres of land.

The best waterfowl breeding and wintering habitats in the State of Delaware are found in the Bayshore focus area, which encompasses the coast of central Delaware, from the Cedar Swamp wildlife areas in northern Kent County to Lewes in Sussex County. During the fall and winter, hundreds of thousands (251,706 in January 2004) of waterfowl use the area for feeding and roosting; there are significant numbers of Canada goose, snow goose, pintail, black duck and mallard. Over 80 percent (200,000) of the Atlantic Flyway’s snow goose population winters in this focus area (Delaware 2004). In addition, this area also contains the largest concentration of northern shoveler, American widgeon, and gadwall in the State and is also noted for the production of American black duck and wood duck.

The Bayshore focus area is also very important for other migratory birds. Located along the eastern coast of Delaware, it provides some of the most critical habitat (e.g., beach, dunes, adjacent marshes and impoundments) for migratory shorebirds. More specifically, this focus area is the major stopover refueling site for over a million shorebirds during the spring migration, including 80 percent of the Western Hemisphere's red knot population and significant numbers of dunlin, ruddy turnstone, semipalmated sandpiper, least sandpiper, short-billed dowitcher, and others.

Major threats to waterfowl in the Bayshore focus area include increasing development, decreasing water quality, oil spills, and invasive species. Vast areas of forest and wetland habitats are being lost to facilitate agriculture and residential development. Conservation recommendations focus on protecting, restoring, and enhancing wetlands and associated upland habitats to form larger contiguous blocks of natural habitats along with connections to undisturbed habitat within the Bayshore area. With respect to Delaware's portion of the ACJV plan, 3,000 acres have been targeted for protection, 40,000 acres for enhancement, and 500 acres for restoration. We have used this ACJV information when developing the various alternative scenarios with respective future management goals, objectives, and strategies.

#### **North American Waterbird Conservation Plan**

The North American Waterbird Conservation Plan is the product of an independent partnership of individuals and institutions wanting to conserve waterbirds and their habitats (version 1.0 – 2002). The plan provides a continental framework for the conservation and management of 210 species of waterbirds utilizing aquatic and wetland habitats. It sets goals and priorities for waterbirds during nesting, migration, and non-breeding periods. The plan provides an overarching framework for regional conservation planning, provides focused guidance for local conservation planning and action, and gives a larger context for local habitat protection. The plan can be accessed online at: <http://www.waterbirdconservation.org> (accessed January 2012).

#### **Partners in Flight North American Landbird Conservation Plan**

The Partners in Flight (PIF) North American Landbird Conservation Plan reviewed the conservation status of 448 native landbird species that regularly breed in the U.S. and Canada. The purpose of this continental plan is to provide an overview of the highest priority landbirds in North America. These birds include not only those species that are of conservation concern due to population declines and small ranges, but those that are characteristic of major habitat types and are essential to the biological integrity and long-term ecological stability of entire eco-regions. Following the lead of the NAWMP, PIF has made the commitment to conserve the resident, short-distance, and neotropical migrant landbirds and their regional habitats on the continental landscape (Rich et al. 2004). The PIF vision states "*Populations of native birds will occur in their natural numbers, natural habitats, and natural geographic ranges, through coordinated efforts by scientists, government, and private citizens.*"

Two groups of bird species were identified as having high conservation importance: the PIF Watch List, made up of species with the greatest conservation need, and stewardship species that are particularly characteristic of regional avifauna. Watch list species are considered to be in immediate trouble and are at risk of extinction or serious decline, while stewardship species are native bird species that are characteristic of unique ecosystems.

Of the 100 watch list species, 66 are also stewardship species. Examples of high-priority watch list species that Prime Hook NWR manages for include salt marsh sparrow, seaside sparrow, Nelson's sparrow, Henslow's sparrow, black rail, prairie warbler, prothonotary warbler, short-eared owl, willow flycatcher, red-headed woodpecker, and wood thrush. Significant stewardship species that can

be managed for on the refuge include Acadian flycatcher, pine warbler, yellow-throated warbler, eastern towhee, chuck-will's widow, and white-eyed vireo.

#### **Mid-Atlantic Coastal Plain–Physiographic Area 44 Plan**

Several regional PIF plans have been stepped down from the national effort and the regional plan pertinent to the refuge is the Mid-Atlantic Coastal Plain Area 44 Plan, which covers about 13 million acres including portions of Virginia, Maryland, Pennsylvania, New Jersey, and all of Delaware (Watts et al. 1999). The PIF 44 plan identifies that managing human population growth (more than 11 million) while maintaining functional natural ecosystems is the greatest conservation challenge in Area 44.

The pace of habitat loss within this area suggests that future success of conservation planning will require swift identification and preservation of remaining habitat patches. Priority bird species were sorted by habitat to delineate the highest priority habitats in need of critical conservation attention to conserve regionally important PIF bird populations. Priority habitats pertinent to Prime Hook NWR conservation planning with keystone bird species are: salt marsh–black rail, salt marsh sparrow, seaside sparrow, and American black duck; forested wetlands–prothonotary warbler and Acadian flycatcher; mixed upland forest–wood thrush, eastern wood-pewee, scarlet tanager, red-headed woodpecker, Cooper's hawk, and barred owl; and early successional–prairie warbler and Henslow's sparrow.

Specific conservation recommendations for this physiographic area include strict protection of beach and barrier dune habitat to minimize productivity losses of priority species, prioritize and protect all sites with greater than 125 acres of high marsh, protect forest blocks that support significant populations of prothonotary warbler or wood thrush, and manage or restore early successional habitats greater than 125 acres to support Henslow's sparrow. We considered the restoration and maintenance of identified priority habitats and habitat requirements of the highest priority species in the development of the CCP.

#### **U.S. Shorebird Conservation Plan**

The U.S. Shorebird Conservation Plan was developed with the purpose of creating conservation goals, identifying critical habitat, and promoting education and outreach programs to facilitate shorebird conservation. Several groups and individuals, including local, state, and Federal agencies, non-governmental organizations, business-related sectors, researchers, educators, and policymakers helped craft the plan document, which summarizes all the latest hemispheric and national population shorebird estimates and recommendations for regional step-down plans along with conservation goals and critical habitat identification. The plan can be accessed at: <http://www.fws.gov/shorebirdplan/USShorebird/downloads/USShorebirdPlan2Ed.pdf> (accessed January 2012).

At the regional level, Prime Hook NWR is part of the North Atlantic planning region within the Atlantic Flyway, which includes 12 states and encompasses Biological Conservation Regions numbers 30 and 14. The Northern Atlantic Regional Shorebird Plan (version 1.0–Clark et al. 2001) identified the major habitat types supporting shorebirds in this region, which include beachfront and high beach dune, intertidal mudflats, vegetated intertidal marshes, and managed impoundments. Inland habitats such as forested wetlands and peninsulas that concentrate migrants, as well as managed uplands are also included. The North Atlantic region is extremely important for transient shorebirds during both northbound and southbound migrations.

The region is critical for the Western Hemisphere population of red knot, which is highly concentrated in Delaware Bay each spring. It also supports most of the Atlantic Flyway's breeding piping plovers. Shorebird species of the highest regional priority that can be managed for on refuge lands by habitat type include:

beachfront–red knot, piping plover, ruddy turnstone, and sanderling; intertidal mud–semipalmated sandpiper, American golden plover, greater yellowlegs; intertidal marsh–willet; and earlier successional habitats–American woodcock and buff-breasted sandpiper.

### **The Emergency Wetlands Resources Act**

The Emergency Wetlands Resources Act was enacted in 1986 to Regional Wetland Concept Plan, Northeast Region to promote the conservation of wetlands nationwide. Through this act, the Department of the Interior was directed to develop a national wetlands priority conservation plan identifying the location and types of wetlands that should receive priority attention for acquisition by Federal and state agencies using Land and Water Conservation Fund appropriations. In 1990, the Service's Northeast Region completed a regional wetlands concept plan that complemented the national plan by providing more detailed information about the wetland resources of the Northeastern states (USFWS 1990).

The regional wetlands concept plan identifies 850 wetland sites that warrant consideration for acquisition. It also describes wetland functions and values as well as identifies habitat loss and threats to wetlands remaining in the region. Of the 16 wetland sites identified in the State of Delaware, 8 sites are located in Sussex County. Two sites are immediately adjacent to the refuge: 300 acres (Huckleberry Swamp) and 200 acres (Sowbridge Branch) in Milton/Ellendale, while the remaining six sites are scattered throughout the county. We used this information as we develop our land protection strategies.

### **Partners in Amphibian and Reptile Conservation**

Partners in Amphibian and Reptile Conservation (PARC) is a diverse partnership of public and private organizations, and is the most comprehensive herpetofauna conservation effort undertaken in the U.S. PARC, which is a unique national and international conservation network of comprehensive information on all reptiles and amphibians, is solely habitat focused. It provides the best available science to conserve and protect herpetofaunal habitats and species.

PARC keys in on endangered and threatened species but also advocates keeping common native species common. Their mission is “to conserve amphibians, reptiles and their habitats as integral parts of our ecosystem and culture through proactive and coordinated public and private partnerships.” PARC’s partners include Environmental Protection Agency (EPA) Office of Wetlands, Service-Northeast Region, USGS Biological Resources Division, and many more: <http://www.parcplace.org> (accessed January 2012).

In 2000, the Northeast regional working group of PARC (NEPARC) began work to assess factors contributing to the risk and potential vulnerability of northeastern amphibians and reptiles. Their Web site serves as a repository of biological attributes for Anura (frogs and toads), Caudata (salamanders and newts), Squamata (snakes and lizards) and Testudines (sea and freshwater turtles): <http://www.northeastparc.org/> (accessed January 2012)

This information, along with Habitat Management Guidelines for Amphibians and Reptiles of the Northeast (Mitchell et al. 2006) and Southeast (Bailey et al. 2006), was used to develop habitat management objectives and strategies to maintain the common native species and protect some of the rarest Delaware herpetofaunal species documented on the refuge.

### **Delaware Comprehensive Wildlife Conservation Strategy**

In 2001, new funds appropriated by Congress known as the state wildlife grants program, were used to challenge the states to demonstrate wildlife conservation management in complete terms—not just game, sport fish, and endangered species, but comprehensive wildlife conservation (i.e., all species and all habitats). The Delaware Division of Fish and Wildlife developed its Delaware Wildlife Action Plan (DEWAP 2005). The plan is a compilation of comprehensive strategies for conserving the full array of native wildlife and habitats, both common and uncommon, as vital components of the State’s natural resources.



This plan recognizes development pressure and loss of wildlife habitats as threatening the existence of many of Delaware's indigenous species of concern, such as the hooded warbler, carpenter frog, Bethany firefly, Delmarva fox squirrel, coastal plain swamp sparrow, and hundreds of others. The State is implementing a new comprehensive approach to wildlife conservation to keep common species common and healthy ecosystems healthy. The plan was developed with the participation of several Statewide conservation partners, which included refuge staff.

The plan identifies 457 species of greatest conservation need and 50 different types of habitats. Habitats of conservation concern are highlighted in yellow in chapter 3 and featured as key wildlife habitats. These habitats are rare and under-represented within the State's landscape, have special significance in Delaware, are particularly sensitive to disturbance, or have a high diversity of rare plants. Habitats with any of these factors are known, or expected, to harbor species of greatest conservation need, especially insects that are often dependent on specific host native plants.

Large blocks of unfragmented forests and wetlands were also designated as key wildlife habitats because of their importance to area-sensitive species, particularly invertebrates. A minimum size of 250 acres, criteria established by the State for the Delmarva conservation corridor demonstration program, has been used. Key wildlife habitats consist of any areas with species of greatest conservation need occurrences, habitats of conservation concern, forest blocks greater than 250 acres, and wetland blocks greater than 250 acres.

The Delaware Wildlife Action Plan identified and summarized 90 different conservation issues affecting State species or habitats of conservation concern. Implementation steps have included listing 230 different conservation actions to remedy these conservation issues. We have relied heavily on the plan and conferring with our State partners when developing habitat objectives and management strategies during the CCP process. We have incorporated State information in the development of this document, and will continue to coordinate conservation actions for both plans (Delaware Wildlife Action Plan and refuge CCP) in the future.

### **Sussex County Comprehensive Plan**

The Sussex County comprehensive plan update, a 5-year plan that outlines Sussex County's vision for itself in the future and how best the county and its people can make that vision a reality, was adopted June 24, 2008, and certified by Governor Ruth Ann Minner on October 27, 2008. This plan considers parks, natural areas, forests, wildlife habitats, greenways, and waterways as important components of Delaware's quality of life. The objective of the strategies in the revised plan is to direct new growth toward existing communities and avoid unplanned sprawl and loss of open space ([www.sussexcountymd.gov/](http://www.sussexcountymd.gov/); accessed January 2012).

The conservation element of the Sussex County plan has the stated goal of "protecting critical natural resources by documenting their locations and developing growth management strategies that limit development in these areas." This chapter of the plan describes State ownership (5 parks, 8 wildlife management areas, 19 ponds, nature preserves, and cultural sites), Redden State Forest, and Federal lands (Prime Hook NWR) in Sussex County, which collectively define the excellent examples of Delaware's remaining natural and cultural heritage. These include productive wetlands, mature forests, rare plant and animal habitats, geological and archeological sites, and open space for recreation and greenway connectors.

Sussex County's open space program has multiple sources of funding targeted to protect additional acres planned for natural resource area protection. Seven resources areas have been delineated with proposed acreage add-ons. The



program activity in the plan's summary identifies 42,259 acres as currently protected and an additional 44,441 acres to be included in the future. Topping the list is the Prime Hook area, which is currently listed as 11,668 acres protected with a proposed addition of 14,678 acres. Three other areas (Ellendale/Redden, Great Cypress, and Nanticoke River additions) have important implications for the Service and the Delaware Division of Fish and Wildlife's joint venture of developing a proposed endangered species habitat conservation plan for Sussex County for the Delmarva fox squirrel.

## **Broadkill River Watershed Pollution Control Plan**

Water quality assessments performed by DNREC have shown that more than 90 percent of Delaware's waterways are considered impaired. For example, 2,506 miles of rivers and streams have been tested for water quality attainment, and 2,490 miles have been documented as impaired. Likewise, 2,954 acres of lakes, ponds, and reservoirs have been tested Statewide, and 2,796 acres were found to be impaired. Impaired waters are deemed polluted waters that could be suffering from excess nutrients, low dissolved oxygen, toxins, bacteria, or any combination of these problems.

The most common impairments in Delaware are pathogens and nutrients (nitrogen and phosphorus). The majority of impairments come from hard-to-control nonpoint sources. Sources of impairments in the State are agricultural runoff, municipal (urbanized, high-density areas) impervious runoff, land disposal, decentralized septic systems, municipal point source discharges, industrial point discharges, Resource Conservation and Recovery Act hazardous waste sites, and combined sewer overflows (National EPA Assessment Database for State of Delaware Year 2002; available at: [http://iaspub.epa.gov/waters10/w305b\\_report\\_v2.state?p\\_state=DE](http://iaspub.epa.gov/waters10/w305b_report_v2.state?p_state=DE); accessed January 2012).

Impervious cover, such as blacktop and concrete, prevents water from permeating the ground. Many scientists look to impervious percentages as an indicator of water health. Research has consistently shown that once a watershed exceeds a threshold of 10 percent imperviousness, water and habitat quality irreversibly decline (Broadkill watershed land-use trend data at: <http://broadkill.ocean.udel.edu>; accessed January 2012). Currently, the Broadkill River watershed's impervious cover is 6.7 percent, but DNREC notes that surface waters are already impaired within the watershed. During a 10-year period from 1992 to 2002, there was a 40.2 percent increase in residential development, while agricultural and forested land area each decreased by 7.1 percent during this same period.

Wetlands are estimated to occupy about 16,000 acres of the watershed's land base. These include 8,361 palustrine acres, 6,786 estuarine acres, 539 lacustrine acres, and 146 riverine acres. Prime Hook NWR contributes approximately 8,000 acres of wetland habitats to the watershed total. Wetlands are critically important for helping achieve water quality standards and are useful for reducing nonpoint source pollutants. The Town of Milton is the urban center of the watershed with small portions of the city of Lewes and the Town of Georgetown lying on the outer edges of the watershed boundary. Protecting the natural resources and the water quality of the Broadkill River watershed is currently being addressed by the State and local governments and citizens.

As the problem is very complex, DNREC and the University of Delaware Sea Grant Program have coordinated a group of stakeholders (refuge is a participant in this process) to develop a comprehensive Broadkill River pollution control plan. Section 303(d) of the Federal Clean Water Act requires states to develop a list (303(d)-List) of waterbodies for which existing pollution control activities are not sufficient to attain water quality criteria and to develop total maximum daily loads (TMDLs) for pollutants causing impairments. A TMDL sets a limit on the amount of pollutant that can be discharged into a waterbody and still protect healthy water conditions. DNREC has listed the Broadkill River on

several of the State's 303(d) listings and has set various TMDLs regulating nitrogen, phosphorus and enterococcus bacteria (section 7418–Total TMDLs for the Broadkill River Watershed DNREC 2004, <http://broadkill.ocean.udel.edu>; accessed January 2012).

#### **Other Scientific Information Guiding the Project**

##### **Sea Level Affecting Marshes Model (SLAMM)**

The Service is addressing the potential for significant changes that will be felt by all coastal refuges due to climate change and sea level rise. A comprehensive modeling effort using what is called the SLAMM has been used to generalize gross effects of sea level rise on coastal national wildlife refuges. SLAMM was first developed by the EPA in the 1980s (Park et al. 1986) and attempted to simulate the dominant processes (inundation, erosion, overwash, and saturation) involved in wetland conversion and shoreline modification from long-term sea level rise in an effort to predict future land cover changes in response to sea level rise. The model has been continuously refined and updated; the results incorporated into this planning effort used SLAMM version 5 in 2007. An updated version of SLAMM (6.0.1) is now available, but was not available at the time the analysis was completed for the refuge. However, the refuge analysis did use high-resolution elevation data not typically utilized for applications of SLAMM at that time (Scarborough 2009). The limitations of the modeling analysis conducted in 2009 are acknowledged in Scarborough 2009, below, and elsewhere in the CCP. Although modeling data should be considered with caution, as high levels of uncertainty and unforeseeable factors can significantly alter model output projections and habitat predictions for the future, the results of this modeling effort can give us a general sense of how climate change and sea level rise will likely affect refuge habitats in the future. The potential land cover changes predicted by the SLAMM modeling are incorporated into the discussion of the existing environment (chapter 3) and were considered in the development of management objectives and strategies (chapter 4). However, these modeling results are certainly not the primary factor driving proposed changes in shoreline and wetland management regimes on the refuge, as the refuge increasingly has current locally collected data to rely upon.

Prime Hook NWR was included in an initial SLAMM simulation of the Chesapeake Bay region contracted by the National Wildlife Federation in 2008. SLAMM model accuracy depends on available elevation data. Because the 2008 report used very coarse elevation measurements (5-foot contours), the results provided minimal information containing questionable value for the refuge. Therefore, a second SLAMM simulation for Prime Hook NWR was conducted by the Delaware Coastal Program (Scarborough 2009). The simulations done by the Delaware Coastal Program used Light Detection And Ranging (LiDAR) data with a vertical accuracy better than 15 cm, or less than 6 inches, which is a significant improvement over the 2008 simulation. The results of this modeling effort show 2007 conditions, and project future conditions in 2025, 2050, 2075, and 2100 (Scarborough 2009).

In the 2009 SLAMM modeling effort, two sea level rise conditions were used as inputs, representing the range of predicted local sea level rise levels (0.50 meters and 1.0 meters). The SLAMM model does not incorporate a dynamic accretion rate that changes with varying sea level rise, which could influence and possibly improve the ability of the wetlands to keep pace with sea level rise. Delaware salt marshes generally have been keeping up with the rate of sea level rise over the past century, but it is uncertain whether the marshes may experience increasing accretion rates as sea level rise occurs. Therefore, two rates for the accretion of salt marsh were used in model simulations: 3.1 mm/year, which represents keeping pace with current sea level rise, and 5.0 mm/year, which represents an increase in accretion rates in response to increased sea level rise. Tidal range was also incorporated into the model at two levels. A 50 percent coastal tide value (0.79 m) approximates the tidal range at the refuge's wetland complex at the

time the modeling was conducted in 2007, and assumed that the bay dunes would remain intact. The 100 percent coastal tide value (1.58 m) assumes the expansion of the existing dune breaches along the bay front so that the full tidal range of the bay occurs in the refuge's impoundments. The model used these estimated minimum and maximum input values, assuming that the actual values will probably fall somewhere within those ranges.

By the year 2050, the SLAMM model projects that at least half of the current upland area of the refuge will be lost (either converted to wetlands or open water), decreasing from 20 percent to, at most, 12 percent of the current land base. Open water and tidal mud flat areas may increase throughout the next 100 years. If sea level rises at an accelerated rate to 1 meter in the next 100 years, the impact will be much greater on the refuge. By the year 2050, open water and mudflats are predicted to constitute 26 percent of the refuge under conditions that would allow marshes to build at high accretion rates; up to 58 percent of the refuge would convert to open water or mudflats under the condition of low accretion rates. Under the worst case scenario, by the year 2100 up to 88 percent of the today's refuge could be open water or tidal mud flats and only 1 percent for the refuge would be uplands. Predicted land cover changes under each sea level rise scenario are fairly similar with or without the bay dunes remaining intact. Although these long-term predictions are helpful for refuge planning, it is worth noting that as conditions on the refuge change in the predicted manner, the ability of the refuge to manage wetlands through water level manipulation and exclusion of saltwater from impoundments will be lost long before the full effects of the sea level rise impact are realized. The full SLAMM modeling report (Scarborough 2009) can be found at: <http://www.dnrec.delaware.gov/coastal/Documents/PHNWR%20SLAMM.pdf> (accessed August 2012).

#### **NatureServe: Terrestrial Ecological Classifications, Vegetation Alliances, and Associations of Prime Hook NWR**

The inventory and creation of vegetation mapping of the Prime Hook NWR was conducted during the pre-planning and planning phase of this CCP. The Refuge System planning policy notes that all Federal agencies are required to comply with data standards established by the Federal Geographic Data Committee. The policy comments on the use of two standards important to refuge planning: National Vegetation Classification Standard (NVCS) and Classification of Wetlands and Deep Water Habitats (<http://www.fgdc.gov>; accessed January 2012).

The Service contracted with the Delaware Natural Heritage Program (DNHP) and NatureServe to develop vegetation cover maps of Prime Hook NWR for the CCP. The NVCS classifies vegetation on a national scale for the U.S. and is linked to an international vegetation classification. NVCS for terrestrial vegetation is classified within a nested, seven-level hierarchy of plant communities. The finest floristic unit of the classification standard is called the association, characterized by diagnostic species of vegetation. An alliance represents an aggregation of associations that share at least some primary dominant species. NatureServe completed a NVCS vegetation alliances and associations report of refuge cover-types in December 2006, which complemented the refuge-mapping project undertaken by DNHP. NatureServe resolved some classification problems of several communities unique to Prime Hook NWR that were not adequately described in previous community keys.

The NatureServe report included vegetation descriptions and global conservation rankings for natural communities that were found on the refuge. These vegetation coverages included 5 NVSC classes and 38 alliances and associations. Eight associations were ranked globally rare (G2 and/or G3) with distinctive native plant assemblages and unique vegetation communities restricted to the Coastal Plain of the Mid-Atlantic. This data and information has been used in the development of this CCP document. The maps can be found in chapter 3 and in the habitat management plan in appendix B.

### **Natural Heritage and Endangered Species Program (DNREC): Final Report on Botanical Zoological and Natural Community Surveys for Prime Hook NWR**

The primary focus of botanical surveys at Prime Hook NWR was to locate and identify State and Federal rare plant species within refuge boundaries. Surveys in 2004 and 2005 focused on a variety of upland and wetland habitat types and built upon work conducted by the Delaware Division of Fish and Wildlife in the past. All rare plant species discoveries were Global Positioning System (GPS)-located with detailed habitat and population notes recorded. In addition, trees of exceptional size (as compared to State records) were documented, an extensive general Prime Hook NWR flora list was catalogued, zoological surveys were conducted for reptiles, amphibians, and rare insects and management recommendations for protecting and enhancing habitat occupied by rare species and/or unique plant communities were detailed (McAvoy et al. 2007).

Notable rare and unique communities found at the refuge included Atlantic white cedar/seaside alder, red maple/seaside alder woodlands, slender seaside purslane (*Sesuvium maritimum*) community, and a peat mat community. The twig-rush peat mat community is extremely rare in Delaware and on the East Coast and contains the largest array of the rarest plant species of any community mapped on the refuge. It is a distinctive community that forms in open-water depressions, impoundments, and seeps within a freshwater shrub-dominated swamp matrix. Prime Hook NWR NVCS mapping and community survey data were used to develop habitat objectives and associated management strategies during the CCP planning process (McAvoy et al. 2007).

### **Maryland, Delaware New Jersey GAP Project**

Gap analysis provides an overview of the distribution and conservation status of several components of biodiversity. There are five major objectives of the national GAP analysis program:

- Map actual vegetation as closely as possible to the alliance level.
- Map predicted distribution of animals, habitat associations, and habitat variables.
- Document occurrence of vegetation types that are inadequately represented (GAPS) in special management areas.
- Document occurrence of animal species that are inadequately represented (GAPS) in management areas.
- Make all information available to resource managers and land stewards in a readily accessible format.

The Maryland-Delaware-New Jersey Gap Analysis Project (MDN-GAP) involved a 10-year effort of researchers from various government natural resource agencies and universities in all three states, with the bulk of the work and project administration carried out by the Service, Delaware Bay Estuary Project, University of Maryland Eastern Shore, USGS-Biological Resources Division Gap Analysis Program and the New Jersey Department of Environmental Protection. The three-state project area includes a complex mixture of habitats, ranging from coastal beaches and estuarine tidal marshes to upland forests and bogs, and human-dominated urban and agricultural landscapes.

Data from the project was used to develop maps to conduct refuge habitat analysis discussions during CCP public and technical meeting forums. Maps were developed at three scales: refuge-specific (10,000 acres), Statewide (1.3 million acres), and an intermediary-scale of an immediate impact zone surrounding the refuge (88,000 acres). The impact zone map encompassed acreage from



two watersheds where Prime Hook NWR is located: the Mispillion River and Broadkill River watersheds.

Habitat analysis layers depicted on these maps were derived from several sources, including the MDN-GAP project, National Wetlands Inventory Data, and National Land Cover Data set developed by the EPA. Approximately 100 habitat classes were clumped into 10 habitat-types, providing a coarse-filter analysis across all three scales. These habitat-types included: upland herbaceous, upland shrub, upland forest, wetland herbaceous, wetland shrub, wetland forest, sparsely vegetated, aquatic, agricultural, and urban. Impact zone maps also depicted municipal boundaries, State agricultural preservation districts, and agricultural easements (appendix A).

### **Delmarva Fox Squirrel Recovery Plans**

The Delmarva Peninsula fox squirrel (*Sciurus niger cinereus*) was listed as federally endangered in 1967 because of concerns for a reduction in its distribution to only 10 percent of its historic range. There have been three recovery plans written for this subspecies with the most recent completed in 1993. The recovery plans emphasized two action objectives: identify critical Delmarva Peninsula fox squirrel habitat requirements and translocate Delmarva Peninsula fox squirrel into suitable habitat outside occupied areas within their historical range. The range of the Delmarva Peninsula fox squirrel has expanded since the 1993 recovery plan, as the squirrel is now considered likely to occur in approximately 25 percent of the Delmarva Peninsula. This expansion has occurred through 11 successful translocations, of which one was on Prime Hook NWR.

By 1995, the refuge translocations were deemed successful as per the recovery plan definition, (i.e., a new reproductive population established on the release site had persisted for at least 5 years and increased beyond the original group size; the founder population at Prime Hook NWR was 15 individuals). Refuge management recommendations by the recovery team in 1995/1996 emphasized the need to augment the current Delmarva Peninsula fox squirrel refuge population with additional translocations, reforest fallow fields to add to the refuge's base acres of forested upland habitat, and conduct a population viability analysis to estimate the minimum viable population needed to prevent inbreeding, problems of genetic drift, and loss of heterozygosity, and then manage accordingly.

Today, the effective Delmarva Peninsula fox squirrel population size on Prime Hook NWR is very small, estimated at approximately 15 squirrels. The population size has remained small even after three decades of persistence with minimal recruitment. The chronically small population size of squirrels within refuge boundaries contributes to unmitigated inbreeding depression and genetic drift and is a major conservation concern. Limited recruitment coupled with small population size negatively affects long-term survival of the squirrels on the refuge.

Currently, new data and a population viability analysis are available. The analysis was constructed for Delmarva Peninsula fox squirrel that developed a basic model using estimates of life history parameters to identify the minimum viable population. Under model scenarios, analysis suggests that a population with 65 females or 130 animals has a less than 5 percent chance of extinction in 100 years. Using an average density calculated 0.3 squirrels/acre, 435 acres are needed to minimally support 130 Delmarva Peninsula fox squirrel. The analysis estimates that a contiguous 435-acre block could establish a minimally secure population. We have used this information when developing refuge habitat objectives and future conservation strategies for endangered species management on the refuge.



## **Other Recovery Plans**

### **Atlantic Coast Piping Plover Recovery Plan**

Federally threatened piping plovers use the refuge during spring and fall migrations. Up to half a dozen piping plovers have been observed using refuge impounded marsh habitats during late August and September. Nesting has not yet occurred on refuge beaches, but an increase in overwash habitats is occurring in our Unit I salt marsh management area. State endangered species personnel and refuge staff conduct periodic shorebird surveys and are alert to piping plover nesting possibilities, and will follow standard protocol if nesting occurs.

In 1996, a revision was made to the original 1988 Atlantic Coast piping plover recovery plan (USFWS 1996). The primary objective of the revised recovery program is to remove the piping plover population from the List of Endangered and Threatened Wildlife and Plants. The plan hopes to do this by achieving well-distributed increases in numbers and productivity of breeding pairs and providing for long-term protection of breeding and wintering plovers and their habitat. The strategies within the plan provide for the ensured long-term viability of piping plover populations in the wild. Documented piping plover breeding sites in Delaware occur immediately south of the refuge.

In Delaware for the past 17 years, a range of 8 to 12 pairs have successfully fledged young and DNREC has been working to halt the species' population decline by adopting a State piping plover management plan, implemented by the Division of Parks and Recreation, Division of Fish and Wildlife, and Division of Soil and Water Conservation. We have incorporated both the Atlantic Coast piping plover recovery plan and State plan information into this CCP document and will coordinate with the State in all Delaware conservation actions to manage and monitor piping plover use of the refuge.

### **Chesapeake Bay Region Bald Eagle Recovery Plan**

National improvements in bald eagle recovery have led to Federal delisting, though eagles are still protected by the Migratory Bird Treaty Act and Bald and Golden Eagle Protection Act; and are still listed as State endangered in Delaware. The first successful bald eagle pair fledged two young on the refuge in 1993. This pair uses several nests they have constructed through the years in Unit II, and has continued to produce young in recent years. During winter 2006, a second pair established a nest near the headquarters area in Unit III and successfully fledged three young in fall 2006, although nesting activity has been inconsistent each year since then. We have also incorporated the guidelines of the Chesapeake Bay Recovery Plan and the Service's and State's bald eagle management guidelines in this document when developing habitat conservation strategies and managing public use to protect bald eagles.

### **Archaeological, Historical, and Geomorphological Study of Prime Hook NWR**

The Service, Region 5 contracted with Tetra Tech FW, Inc., to provide a set of interrelated studies of Prime Hook NWR, including lands within its acquisition boundary that have not yet been acquired. The resulting effort fulfilled the Service's responsibilities to cultural resources under the National Historic Preservation Act (P.L. 102-575, Sec. 110), NEPA (P.L. 91-190), and Department of the Interior-Service regulations. The archaeological, historical, and geomorphological study of the refuge provided a comprehensive background of data and analysis to improve our understanding of the refuge's prehistory and history, and assist in both visitor interpretation and long-term management of cultural resources.

### **NEXRAD (Radar) Data Of Critical Stopover Habitat For Songbirds Along The Delmarva Peninsula.**

The New Jersey Audubon Society and Service partnered on a project in fall 2003. With the goal of developing products that would assist land acquisition and management strategies to conserve stopover habitats used by songbirds during migration passage through the Delmarva Peninsula. This project was unique

because of its methodological approach and operational scale. The National Weather Service's Doppler weather surveillance radar system was used to delineate the spatial distribution of songbird migrants.

The objectives of the project were to use the radar data identify areas that contain high rates of occupancy; investigate relationships between high-use stopover sites and specific habitat types and landscape features; determine spatial congruence between season-specific stopover occupancy models; and identify specific songbird species or species groups involved in migration events during passage through the Delmarva Peninsula (Mizrahi 2006).

Flight call recording systems were installed at both Prime Hook NWR and Blackwater NWR during the spring (April 3 to June 6) and fall (July 24 to November 15) 2003 migrational periods. We applied and utilized significant refuge songbird use with species identification and correlated habitat use data in this CCP when we developed migratory songbird conservation strategies and associated habitat objectives.

### **Neotropical Migratory Songbird Coastal Corridor Study**

This study examined the distribution and habitat associations of fall migrating landbirds within the coastal regions of four states along the Atlantic Coast (McCann et al. 1993). These states of New Jersey, Delaware, Maryland, and Virginia make up the Cape May and Delmarva peninsulas. These two areas are well-known for their contribution of stopover habitat for migratory birds. The study revealed that neotropical migrants are not randomly or evenly distributed over the Cape May and Delmarva peninsulas during stopover, but rather are concentrated in particular geographic areas within the region.

More specifically, the study suggested that migrant birds are more abundant in areas close to the coastlines than in equivalent areas farther from the coast. Other distribution patterns discerned were that bay coastal zones have higher densities of migrants than seaside coastal zones or interior regions; migratory songbirds are more abundant on barrier islands than the coastal mainland, and migrants are associated with particular habitats on a species-specific basis. The refuge used this information in developing habitat objectives and strategies and shaping various alternative scenarios. We also assimilated and dove-tailed the habitat objectives and conservation strategies for migratory songbirds of other refuges within the coastal Delmarva Peninsula corridor that have completed CCPs.

### **USGS Visitor and Community Frequency Results Report for Prime Hook NWR**

Refuge-specific visitor use and community opinions research was conducted by the Policy Analysis and Science Assistance Branch of the USGS/Fort Collins Science Center. This report summarized community and visitor surveys conducted at Prime Hook NWR in fall 2004 through fall 2005, and its purpose of this study was to determine how current and future CCP planning strategies for the refuge could affect visitor use, experiences, and spending, and community residents' perceptions and opinions about the refuge. Much of the research results have been included in chapter 3 of this document and were also used in developing visitor management objectives.

### **State Comprehensive Outdoor Recreation Plan**

Delaware's State Comprehensive Outdoor Recreation Plan (2003 to 2008) identifies State and individual counties' outdoor recreation needs and issues and provides recommendations on how to meet those needs. The State Comprehensive Outdoor Recreation Plan also maintains Delaware's eligibility to receive Federal Land and Water Conservation Fund grants and is also required by the Delaware Land and Conservation Trust Fund Act. The plan directs funding for both grant sources into open space acquisition and facilities that best meet Delaware's outdoor recreational needs.

In order to remain eligible to receive Land and Water Conservation Fund grants, states are required by the National Park Service to develop an outdoor recreation plan every 5 years. We have incorporated much of the plan's information into the refuge's visitor service objectives and public use strategies to complement some of the State's recreational needs and programs.

## Existing Refuge Operational Plans

### Step-Down Management Plan

The Service Manual (602 FW 4, Refuge Planning Policy) lists more than 25 step-down management plans that may be appropriate to ensure safe, effective, and efficient operation on every refuge. These plans contain specific strategies and implementation schedules for achieving refuge goals and objectives. Some plans require annual revisions; others are on a 5- to 10-year revision schedule. Some require additional NEPA analysis, public involvement, and compatibility determinations before they can be implemented.

Two step-down plans will be available in conjunction with the CCP:

- Habitat management plan (HMP) (2012) (appendix B)
- Hunt plan (2012) (appendix C)

The following plans are available, but need updating. Listed below are those plans and the anticipated revision dates.

- Inventory and monitoring plan (2013)
- Fishing plan (2013)
- Law enforcement plan (2013)
- Visitor services plan (2014)
- Animal damage control plan (2014)
- Furbearer management plan (2014)

The following step down plans are complete and/or updated annually:

- Safety plan (2009)
- Avian influenza plan (2008)
- Hurricane action plan (updated annually)
- Fire management plan (2009)

## Formulating Alternatives Using Refuge Resources of Concern and Focal Species Management

### Defining Refuge Resources of Concern and Management Priorities

As described in the Service's policy on habitat management planning (620 FW 1) resources of concern are defined as:

*All plant and/or animal species, species groups, or communities specifically identified in refuge purpose(s), [Refuge] System mission, or international, national, regional, State, or ecosystem conservation plans or acts. For example, waterfowl and shorebirds are a resource of concern on a refuge whose purpose is to protect migratory waterfowl and shorebirds. Federal or State threatened and endangered species on that same refuge are also a resource of concern under terms of the respective endangered species acts.*

Habitats or plant communities are also resources of concern when they are specifically identified in refuge purposes, when they support species or species

groups identified in refuge purposes, when they support Service trust resources, and/or when they are important in the maintenance or restoration of BIDEH (USFWS 2007b).

We used the process outlined in *Identifying Refuge Resources of Concern and Management Priorities: A Handbook* (USFWS 2007a) to develop the refuge's management goals and objectives for the CCP and HMP. The handbook draws from legislative mandates, Service and Refuge System policies, manuals, and Promises recommendation reports. This process enabled us to:

- Meet our specific legal mandates as directed in statute and policy.
- Determine resources of concern and management priorities specific to the refuge using focal species management strategies.
- Contribute to wildlife and habitat priorities at all scales.

This process of identifying refuge resources of concern entailed analyzing specific planning steps divided into three stages that included various action items. These three planning stages encompassed the following tasks:

- (1) Understanding refuge-specific management mandates.
  - *Action 1: Identify refuge purposes.*
  - *Action 2: Identify Service trust species.*
  - *Action 3: Identify refuge-specific elements of biological integrity, diversity, and environmental health.*
- (2) Identifying resources of concern and management priorities on the refuge.
  - *Action 4: Compile a comprehensive list of resources of concern.*
  - *Action 5: Filter out focal species, consider site capabilities, response to management, and expert analysis, and then list priority resources of concern.*
  - *Action 6: List priority habitats.*
- (3) Establish final assumptions for the future direction and management agenda for the refuge.
  - *Action 7: Write goals.*
  - *Action 8: Write objectives.*

## **Focal Species Management**

To understand the above process and how it was incorporated into our CCP effort, the idea of focal species management and the definition of focal species must be appreciated. A focal species is a species or group of species (guild) that is directly targeted for conservation and habitat management actions. The selection of focal species is associated with important habitat elements or ecosystem attributes of identified species with the greatest and most urgent conservation needs. These needs are based on the Service's BCC (2008), national, ecoregional, and regional plans, and the State of Delaware's Wildlife Action Plan.

Focal species for the refuge have been determined to be those specific species requiring immediate conservation action due to declining populations and other factors. Vulnerability to threats has limited the life history requirements needed to ensure their persistence into the future. Once identified, these species were used to define our habitat management objectives, strategies, and conservation actions contained in this CCP.

The use of focal species facilitated the complex tasks of writing habitat objectives for refuge purpose species (e.g., migratory birds and endangered species) and other Service trust species (e.g., interjurisdictional fish), while incorporating legal mandates of maintaining and enhancing BIDEH on refuge lands.

Identifying focal species served as a shortcut to simplify dealing with a huge list of wildlife species (birds, native plants, insects, fish, reptiles, amphibians, etc.) that currently reside or seasonally use the refuge, and focus habitat management objectives on a shortened list of migratory birds and other wildlife species.

For example, there are over 900 species of migratory birds in North America that are trust species for the Service. The Service's national focal species strategy in its strategic migratory bird management plan (2004 to 2014) has shortened this list to 412 focal bird species. The selection of focal species is a subset of the bird species protected by the Migratory Bird Treaty Act. In 2008, the Service's BCC list narrowed to 139 focal species, targeted for conservation actions based on declining trend data. This list and other ecoregional and State plans, these lists reduced our CCP and HMP biological planning efforts to 45 refuge focal bird species and 4 focal bird guilds. These bird focal guilds and species are listed below.

#### **Refuge Focus Guilds**

- Fall migrating and wintering dabbling ducks
- Spring migrating dabbling ducks
- Migratory landbirds
- Migratory shorebirds

#### **Refuge Focal Bird Species**

- |                            |                               |
|----------------------------|-------------------------------|
| ■ American oystercatcher   | ■ Coastal plain swamp sparrow |
| ■ Sanderling               | ■ American black duck         |
| ■ Whimbrel                 | ■ Snow goose                  |
| ■ Wood thrush              | ■ Virginia rail               |
| ■ Black-and-white warbler  | ■ Forster's tern              |
| ■ Yellow-throated vireo    | ■ Least bittern               |
| ■ Kentucky warbler         | ■ American bittern            |
| ■ Great crested flycatcher | ■ Piping plover               |
| ■ Northern flicker         | ■ Dunlin                      |
| ■ Bay-breasted warbler     | ■ Short-billed dowitcher      |
| ■ Bald eagle               | ■ American avocet             |
| ■ Acadian flycatcher       | ■ Greater yellowlegs          |
| ■ Prothonotary warbler     | ■ Lesser yellowlegs           |
| ■ Black rail               | ■ Prairie warbler             |
| ■ Clapper rail             | ■ Blue-winged warbler         |
| ■ Least tern               | ■ Brown thrasher              |
| ■ Gull-billed tern         | ■ Willow flycatcher           |
| ■ Black skimmer            | ■ Eastern towhee              |
| ■ Willet                   | ■ Field sparrow               |
| ■ Sharp-tailed sparrow     | ■ Northern bobwhite           |
| ■ Seaside sparrow          | ■ Henslow's sparrow           |

The focal species approach was then used to write CCP and HMP wildlife and habitat objectives that linked focal species to habitat management strategies and new conservation actions targeting these wildlife species. It is a multispecies management approach in which the life history and habitat structural requirements of focal species and guilds have been used to define the future management direction and desired conservation outcomes for the refuge, based on the best contribution the refuge makes to both State and regional landscape conservation scales.

In addition to migratory birds, we have included other focal species that include one federally endangered mammal species, four fish species, and four insect species. All focal species and guilds characterize the various NVCS habitat types mapped on the refuge that are also representative of a healthy Delmarva Coastal Plain ecosystem.



It should be noted that with the exception of snow geese, our conservation objectives in this CCP are to increase the population size of all focal bird species. However, due to the disproportionate negative impacts that overabundance of snow geese are having on the functioning of ecosystems on both the breeding and wintering grounds that are adversely impacting other waterfowl and shorebird species, our conservation objectives and strategies in this case are designed to decrease their population size and curtail their use of refuge habitats.

Targeting conservation actions to a few focal species, specifically in habitat management objectives, is made with the assumption that hundreds of other fish, wildlife, and native plant species will benefit (see appendix D–table D-6 for benefiting species list related to focal species and NVCS vegetation communities.) The total tally for the refuge of focal species (54) and guilds (5) includes the birds mentioned above and the following.

## Other Refuge Focal Species

### Endangered species

- Delmarva Peninsula fox squirrel

### Fish

- Striped bass
- Alewife
- Blueback herring
- American eel

### Invertebrate

- Beach dune tiger beetle
- Little wife underwing
- Long-horned beetle
- Maritime sunflower borer

The work products generated from the resources of concern handbook took more than 1 year to develop with input from State, Federal, private and local partners, and the public. The information provided was used in the developing of our goals and habitat objectives for the CCP and subsequent step-down plans that reflect the conservation needs of these focal species. The first product that served as the foundation for subsequent products or tables was a comprehensive list of biological resources found on the refuge. A species matrix was then developed of these potential refuge resources of concern and how they ranked on a State, regional, and national scale (see appendix D).

Other products included summary tables describing all current elements of biological integrity, diversity, and environmental health for each of the natural habitat types found on the refuge. Four tables were generated that describe specific habitat attributes and natural processes responsible for current habitat conditions representing the elements of biological integrity, diversity, and environmental health for barrier beach island, forested upland, wetland forest, and emergent wetland habitats and their associated focal species (appendix D–tables D-1 to D-4).

The next product was a habitat management prioritization table that identified refuge NVCS habitat priorities, listed reasons for their rankings, and described limiting factors and threats that would hinder the conservation of these resources of concern (appendix D–table D-5).

The last resources of concern product was a final comprehensive list of the priority resources of concern for Prime Hook NWR that identified the specific focal species or focal group with associated prioritized habitat-types, their life history and habitat requirements, plus other benefiting wildlife species that would profit by managing for a specific focal species or focal group (appendix D–table D-6).

When reviewing table D-6 within appendix D, it should be noted that some focal species have also been chosen as “umbrella” and “indicator species”. Similar use of focal species has been made by other conservation biologists for site-specific biological planning projects (Chase and Geupel 2005). We have used the concept of umbrella species as appropriate targets for management, and the concept of indicator species as representatives of historic biological integrity, or environmental health conditions. In conservation biology, the protection of an umbrella species with concentrated management of its habitat requirements can extend protection for other priority resources of concern. For example, our decision to manage for larger Delmarva fox squirrel habitat patches makes the squirrel a good candidate umbrella species that benefits many breeding forest interior bird species, migratory landbirds, and other forest-dependent resident wildlife. Similarly, American oystercatchers have been used as an umbrella species representative of overwash and sandy beach habitats.

An indicator species can be used to represent a measure of biological integrity and environmental health. A reliable indicator species can operate as a habitat assessment tool, saving time and money. We have chosen indicator species to be either an individual species or guild whose presence, absence, abundance, or relative well-being in a given habitat type is a sign of the overall health of its environmental condition and ecosystem functioning. For example, presence of the beach dune tiger beetle is indicative of quality, healthy beach and functional panic grass dune grassland habitats. In some cases, a species may serve as both an umbrella species and an indicator species simultaneously. We have chosen certain species or a particular guild as umbrella and/or indicator representatives of a habitat type and used them in developing habitat management objectives and strategies. As such, both groups of identified species are useful as monitoring targets.

Monitoring will be an integral component of biological planning using focal species, such as presence/absence as an inexpensive measure to gauge environmental health, relative abundance, and density of focal species as measures of biological integrity and diversity. Our habitat objectives incorporating specific focal species are based on numerous hypotheses and assumptions using the most recent and best available plant and wildlife survey information. These assumptions will be tested in ongoing refuge monitoring studies where focal species serve as key targets for monitoring endeavors to test the effectiveness of habitat management strategies and conservation actions, or to adjust strategies and actions when outcomes do not meet expectations.